PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-099385
(43)Date of publication of application : 05.04.2002

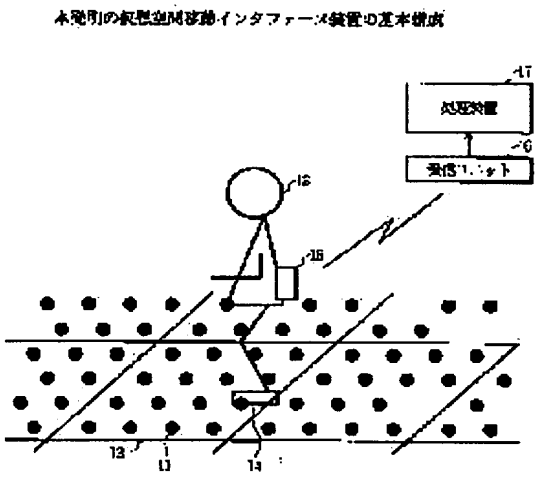
(51)Int.Cl. G06F 3/03
G06F 3/033
G06K 17/00
G06K 19/07
G06K 19/00
G06T 17/40
H02J 17/00
// G01S 13/74

(21)Application number : 2000-292008
(22)Date of filing : 26.09.2000

(71)Applicant : NIPPON TELEGR & TELEPH CORP <NTT>
(72)Inventor : KITAGAWA AIKO
SHIMADA YOSHIHIRO
ISHIBASHI SATOSHI

(54) METHOD FOR GENERATING VIRTUAL SPACE MOVEMENT INFORMATION AND DEVICE FOR INTERFACING VIRTUAL SPACE MOVEMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To convert the movement of a user's foot into movement information in a virtual space by using a non-contact type position measurement system for measuring the position of a mobile object by utilizing ID tags.
SOLUTION: This virtual space movement interface device for inputting movement information necessary to the movement processing of a virtual space display image comprises the ID tags, an ID reader and a processor. The ID tags are arranged on a floor or a platform at prescribed intervals, receive power supply by an electromagnetic induction method and respectively transmit their inherent ID data. The ID reader is attached to the foot of the user standing on the floor or the platform, feeds power to an ID tag and receives ID data transmitted from the ID tag. The processor inputs the ID data received by the ID reader, converts the ID data into position information on the basis of a mapping table for making the ID data correspond to the spatial position of the floor or the platform, and also converts the change of the position information due to the movement of the user's foot into the movement information in the virtual space display image.



LEGAL STATUS

[Date of request for examination] 20.12.2001

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] In the virtual space migration information generation method which generates migration information required for migration processing of a virtual space display image From ID reader attached at a user's feet, power is supplied to ID tag arranged at the predetermined spacing on the floor or the base with an electromagnetic induction type. While changing into positional information based on the mapping table which said ID reader receives ID data which were made to transmit ID data of a proper from each ID tag, respectively, and were transmitted from said ID tag, and matches said ID data and spatial position The virtual space migration information generation method characterized by changing change of the positional information by migration of said user's guide peg into the migration information in said virtual space display image.
[Claim 2] In the virtual space migration interface device which inputs migration information required for migration processing of a virtual space display image ID tag which is arranged at the predetermined spacing on a floor or a base, receives supply of power with an electromagnetic induction type, and transmits ID data of a proper, respectively, ID reader which receives ID data which were attached at feet of the user who rides on said floor or base, supplied power to said ID tag, and were transmitted from the ID tag, While changing into positional information based on the mapping table which inputs ID data received by said ID reader, and matches the ID data and said floor, or the location between base absentminded The virtual space migration interface device characterized by having the processor which changes change of the positional information by migration of said user's guide peg into the migration information in said virtual space display image.
[Claim 3] In a virtual space migration interface device according to claim 2 said ID reader According to distance with said ID tag by vertical actuation of said user's guide peg, it will be in the condition of the receiving within the circle one of said ID data, or either of the receiving outside of the circle. It considers as the configuration transmitted to said processor when ID data are received. Said processor The virtual space migration interface device characterized by being the configuration of supervising ID entry-of-data timing corresponding to reception and un-receiving, and recognizing the input configuration as actuation information which corresponds, respectively. [of ID data in said ID reader]
[Claim 4] In a virtual space migration interface device according to claim 3 said processor When said ID entry of data breaks off only in minute time amount and the same ID data are inputted again, it recognizes as click actuation. The virtual space migration interface device characterized by being the configuration recognized as double click actuation when the condition that said ID entry of data breaks off only in minute time amount is repeated twice continuously and the same ID data are inputted again.
[Claim 5] In a virtual space migration interface device according to claim 2, said ID reader is attached in a total of four places of the section in the tiptoe section of both the said user's guide pegs. Each ID reader is the configuration of transmitting received ID data to said processor. Said processor Set the location of the tiptoe section of a right leg, and the heel section to RT and RH, and the location of the tiptoe section of a left leg and the heel section is set to LT and LH. The virtual space migration interface device which makes both guide pegs a idle state when the distance of RT and LT and the distance of RH and LH become below a predetermined value, respectively, and is characterized by being the configuration of setting the guide peg of another side where while is in a idle state as it is, and makes a guide peg the axopodium and it moves as a directions guide peg.
[Claim 6] It is the virtual space migration interface device characterized by to be the configuration of recognizing click actuation of claim [in / on a virtual space migration interface device according to claim 5

and / axopodium / said / directions guide peg or axopodium / in said processor / the tiptoe section] 4 or double click actuation, click actuation of claim 4 in the heel section or double click actuation, and the click actuation or the double click actuation of claim 4 in the tiptoe section and heel section coincidence according to an individual, respectively.

[Claim 7] It is the virtual space migration interface device characterized by be the configuration recognized as predetermined actuation information when ID data with which one ID reader of said tiptoe section or said heel section receives said processor about said directions guide peg or axopodium in a virtual space migration interface device according to claim 5 are inputted and ID data are not inputted from ID reader of another side .

[Claim 8] In a virtual space migration interface device according to claim 2 said processor When the 1st location measured at the time of click actuation of claim 4 or double click actuation is set to S0, the 2nd location measured by migration of said user's guide peg is set to S1 and the magnitude of a vector of S0 to S1 exceeds a threshold The virtual space migration interface device characterized by being the configuration of changing the direction and magnitude of the vector into the migration information made into the migration direction and passing speed in said virtual space display image.

[Claim 9] In a virtual space migration interface device according to claim 5 said processor About said directions guide peg, at the time of click actuation of claim 6, or double click actuation Or the 1st location of the tiptoe section measured at the time of the quiescent state of claim 5 and the heel section is set to T0 and H0. The 2nd location of the tiptoe section measured by migration of said directions guide peg and the heel section is set to T1 and H1. When the include angle which the vector of H0 to T0 and the vector of H1 to T1 make is below a threshold and the vector of T0 to T1 or the magnitude of a vector of H0 to H1 exceeds a threshold The virtual space migration interface device characterized by being the configuration of changing into the migration information which made the direction and magnitude of the vector of T0 to T1, or the vector of H0 to H1 the migration direction and passing speed in said virtual space display image.

[Claim 10] In a virtual space migration interface device according to claim 5 said processor About said directions guide peg, at the time of click actuation of claim 6, or double click actuation Or the 1st location of the tiptoe section measured at the time of the quiescent state of claim 5 and the heel section is set to T0 and H0. When the include angle which sets to T1 and H1 the 2nd location of the tiptoe section measured by migration of said directions guide peg and the heel section, and the vector of H0 to T0 and the vector of H1 to T1 make exceeds a threshold The virtual space migration interface device characterized by being the configuration of changing the magnitude of the include-angle direction which the vector makes, and an include angle into the migration information made into the hand of cut and rotational speed in said virtual space display image.

[Claim 11] In a virtual space migration interface device according to claim 10 said processor When magnitude with the smaller vector of T0 to T1 of said directions guide peg or the smaller vector of H0 to H1 exceeds a threshold in addition to the migration information about said rotation The virtual space migration interface device characterized by being the configuration of changing the direction and magnitude of a vector of the smaller one of it into the migration information made into the migration direction and passing speed in said virtual space display image.

[Claim 12] Said processor is a virtual space migration interface device characterized by being the configuration which makes a virtual space the migration information going up when a virtual space is made into the descending migration information when only ID data of said tiptoe section are inputted about said directions guide peg in a virtual space migration interface device according to claim 5, and only ID data of said heel section are inputted.

[Claim 13] In a virtual space migration interface device according to claim 5 said processor About said directions guide peg, at the time of click actuation of claim 6, or double click actuation Or the 1st location of the tiptoe section measured at the time of the quiescent state of claim 5 and the heel section is set to T0 and H0. When the 2nd location of T1 or the heel section is set to H1 for the 2nd location of the tiptoe section measured by migration of said user's guide peg, only said T1 is measured and the magnitude of a vector of T0 to T1 exceeds a threshold When it changes into the migration information which made the direction and magnitude of a vector of T0 to T1 the migration direction and passing speed which move in a virtual space while descending, only said H1 is measured and the magnitude of a vector of H0 to H1 exceeds a threshold The virtual space migration interface device characterized by being the configuration of changing the direction and magnitude of a vector of H0 to H1 into the migration information made into the migration direction and passing speed which move in a virtual space while going up.

[Claim 14] It is the virtual space migration interface device characterized by considering as a migration halt when said processor detects click actuation or double click actuation of claims 4 and 6 during migration processing of said virtual space display image in a virtual space migration interface device according to claim 8 to 11, or when the idle state of claim 5 is detected.
[Claim 15] It is the virtual space migration interface device carry out considering said processor as a downward halt and a migration halt in a virtual space migration interface device according to claim 12 or 13 when ID data of said heel section are inputted beyond predetermined time during the migration processing which descends said virtual space, and carrying out as a rise halt and a migration halt when ID data of said tiptoe section are inputted beyond predetermined time during the migration processing which goes up said virtual space as the description.
[Claim 16] It is the virtual space migration interface device carry out said processor gathering passing speed during the migration processing which descends said virtual space in a virtual space migration interface device according to claim 12 or 13 when click actuation or double click actuation of claim 6 is detected about said heel section, and raising passing speed when click actuation or double click actuation of claim 6 is detected about said tiptoe section during the migration processing which goes up said virtual space as the description.
[Claim 17] In a virtual space migration interface device according to claim 1 to 16 said ID tag It is arranged so that at least one ID tag may exist in communication within the limits of said ID reader. It is the configuration that each ID tag which exists in communication within the limits of said ID reader communicates with said ID reader, respectively. Said ID reader It is the configuration of communicating with at least one ID tag of communication within the limits, and receiving the ID data. Said processor When said ID reader acquires one ID data, the spatial position corresponding to the ID data is made into said user's location. The virtual space migration interface device characterized by being the configuration which changes each ID data into space coordinates, and is made into said user's location in quest of the average coordinate value when said ID reader acquires two or more ID data.
[Claim 18] It is the virtual space migration interface device characterized by to be the configuration which will be recognized as click actuation or double click actuation of claims 4 and 6 if the at least one ID data is the same as the same ID data detected at the time of click actuation of claims 4 and 6, or double click actuation when it sets to a virtual space migration interface device according to claim 17 and, as for said processor, one ID reader receives two or more ID data to coincidence.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the virtual space migration information generation method and virtual space migration interface device which generate the migration information in a virtual space by actuation of a user's guide peg.
[0002]
[Description of the Prior Art] As a virtual space migration interface device which generates the migration information in a virtual space by actuation of a guide peg, the example is in JP,11-305907,A (record medium which recorded the information generator on the virtual reality space internal transmigration interface device and the information generation method list).
[0003] In this, aging of the weight migration of a user in an abbreviation level datum plane (disk) is detected, and the technique of changing the weight mobile data into the passing speed vector in the horizontal plane in a virtual space is indicated. Namely, the user who rode on the disk can progress in the direction in a virtual space by standing on the side to which self wants to progress, applying a load to a disk and inclining it. Moreover, the passing speed within the horizontal plane in a virtual space can be adjusted now by a user's adjusting the movement magnitude of the body and adjusting how applying a load.
[0004]
[Problem(s) to be Solved by the Invention] By the way, the visual field in a virtual space is determined by the view positional information detected by the position sensor prepared in the head mount display, the migration direction and passing speed in a virtual space are determined by the weight migration information detected by the displacement sensor attached in the disk, and the above-mentioned conventional virtual space migration interface device has become the structure by which the migration information in a virtual space is generated by both combination.
[0005] That is, when changing the sense into the right and going to a front, for example, the right is made to rotate the sense of the body first, the position sensor of a head mount display detects it, then weight is moved ahead, and it is processed in the sequence that the displacement sensor which attached it in the disk detects. Moreover, in going to the right, without changing the sense, it moves rightward by moving weight to right-hand side by sensibility which sideslips in a virtual space.
[0006] The virtual space migration interface device of the gestalt operated on such foot is compared with the thing of the gestalt operated by hands, such as a mouse and a joy stick, has a thing near the migration feeling in a virtual space, and it has the big merit to which a hand becomes free while there is little sense of incongruity on actuation and it is efficient. However, in order for the equipment configuration for detecting weight migration of a user to have enabled the three dimension directions which move (for example, flight actuation in a virtual space) on a large scale, there was a problem to which an equipment configuration becomes complicated further.
[0007] On the other hand, the non-contact mold location gaging system using ID tag is proposed. This is a system which measures the location of a mobile based on the mapping table which supply power to the successive range of a mobile with an electromagnetic induction type at ID (for example, it embedded to floor) tag arranged at the predetermined spacing, ID data of a proper are made to transmit from each ID tag, respectively, and ID reader receives the ID data, and matches ID data and a spatial position from ID reader attached in the mobile. And it is the system which spacing of each ID tag is set up so that at least one ID tag may exist in communication within the limits of ID reader, ID reader enables two or more ID tags and

communication at once, and measures the location of a mobile from one or more received ID data. Thereby, ID reader of a mobile can acquire ID data from at least one ID tag certainly, and can measure a location. Furthermore, a location can be measured in the precision more than spacing of ID tag by acquiring ID data from two or more ID tags.
[0008] However, this proposed system is not examined till the place which measurement of the positional information of a mobile is the purpose and is used as an input means of a certain actuation information in the measured location.
[0009] This invention aims at offering the virtual space migration information generation method and virtual space migration interface device which can change a motion of a user's guide peg into the migration information in a virtual space using the non-contact mold location gaging system which measures the location of a mobile using ID tag.
[0010]
[Means for Solving the Problem] In the virtual space migration information generation method which generates the migration information which needs this invention for migration processing of a virtual space display image (Virtual space migration information generation method) From ID reader attached at a user's feet, power is supplied to ID tag arranged at the predetermined spacing on the floor or the base with an electromagnetic induction type. While changing into positional information based on the mapping table which ID reader receives ID data which were made to transmit ID data of a proper from each ID tag, respectively, and were transmitted from ID tag, and matches ID data and a spatial position Change of the positional information by migration of a user's guide peg is changed into the migration information in a virtual space display image (claim 1).
[0011] (Virtual space migration interface device) In the virtual space migration interface device which inputs migration information required for migration processing of a virtual space display image, ID tag, ID reader, and a processor constitute this invention (claim 2). ID tag is arranged at the predetermined spacing on a floor or a base, receives supply of power with an electromagnetic induction type, and transmits ID data of a proper, respectively. ID reader is attached at feet of the user who rides on a floor or a base, and receives ID data which supplied power to ID tag and were transmitted to it from the ID tag. A processor inputs ID data received by ID reader, and it changes change of the positional information by migration of a user's guide peg into the migration information in a virtual space display image while changing into positional information based on the mapping table which matches the ID data and floor, or the location between base absentminded.
[0012] (Actuation information) ID reader of the virtual space migration interface device of this invention According to distance with ID tag by vertical actuation of a user's guide peg, it will be in the condition of the receiving within the circle one of ID data, or either of the receiving outside of the circle. When ID data are received, it considers as the configuration transmitted to a processor, and a processor supervises ID entry-of-data timing corresponding to reception and un-receiving, and considers it as the configuration which recognizes the input configuration as actuation information which corresponds, respectively (claim 3). [of ID data in ID reader] Moreover, it is good also as a configuration recognized as double click actuation when the condition that recognize as click actuation when, as for a processor, ID entry of data breaks off only in minute time amount and again same ID data are inputted, and ID entry of data breaks off only in minute time amount is repeated twice continuously and again same ID data are inputted (claim 4).
[0013] Moreover, the virtual space migration interface device of this invention ID reader is attached in a total of four places of the section in the tiptoe section of both the user's guide pegs, and each ID reader is the configuration of transmitting received ID data to a processor. A processor Set the location of the tiptoe section of a right leg, and the heel section to RT and RH, and the location of the tiptoe section of a left leg and the heel section is set to LT and LH. It is good also as a configuration which sets the guide peg of another side where both guide pegs are made into a idle state when the distance of RT and LT and the distance of RH and LH become below a predetermined value, respectively, while is in a idle state as it is, and makes a guide peg the axopodium and it moves as a directions guide peg (claim 5).
[0014] At this time, a processor is the configuration of recognizing click actuation or double click actuation of the tiptoe section, the heel section, the tiptoe section, and heel section coincidence according to an individual about a directions guide peg or the axopodium, respectively (claim 6). Moreover, a processor is a configuration recognized as predetermined actuation information, when ID data which one ID reader of the tiptoe section or

the heel section receives are inputted and ID data are not inputted from ID reader of another side about a directions guide peg or the axopodium (claim 7). (when a heel or a tiptoe is raised)
[0015] A processor sets to S0 the 1st location measured at the time of click actuation or double click actuation. (Horizontal migration information) When the 2nd location measured by migration of a user's guide peg is set to S1 and the magnitude of a vector of S0 to S1 exceeds a threshold, it is the configuration of changing the direction and magnitude of the vector into the migration information made into the migration direction and passing speed in a virtual space display image (claim 8). About a directions guide peg, at moreover, the time of click actuation or double click actuation Or the 1st location of the tiptoe section measured at the time of a quiescent state and the heel section is set to T0 and H0. The 2nd location of the tiptoe section measured by migration of a directions guide peg and the heel section is set to T1 and H1. When the include angle which the vector of H0 to T0 and the vector of H1 to T1 make is below a threshold and the vector of T0 to T1 or the magnitude of a vector of H0 to H1 exceeds a threshold It is the configuration of changing into the migration information which made the direction and magnitude of the vector of T0 to T1, or the vector of H0 to H1 the migration direction and passing speed in a virtual space display image (claim 9).
[0016] (Rotation and horizontal migration information) A processor About a directions guide peg, the 1st location of the tiptoe section measured at the time of click actuation, double click actuation, or a quiescent state and the heel section is set to T0 and H0. When the include angle which sets to T1 and H1 the 2nd location of the tiptoe section measured by migration of a directions guide peg and the heel section, and the vector of H0 to T0 and the vector of H1 to T1 make exceeds a threshold It is the configuration of changing the magnitude of the include-angle direction which the vector makes, and an include angle into the migration information made into the hand of cut and rotational speed in a virtual space display image (claim 10).
[0017] Moreover, a processor is the configuration of changing the direction and magnitude of a vector of the smaller one of it into the migration information made into the migration direction and passing speed in a virtual space display image, when magnitude with the smaller vector of T0 to T1 of a directions guide peg or the smaller vector of H0 to H1 exceeds a threshold in addition to the migration information about rotation (claim 11).
[0018] (A rise or migration information on descent) A processor is a configuration which makes a virtual space the migration information going up, when a virtual space is made into the descending migration information when only ID data of the tiptoe section are inputted, and only ID data of the heel section are inputted about a directions guide peg (claim 12). A processor about a directions guide peg At moreover, the time of click actuation or double click actuation Or the 1st location of the tiptoe section measured at the time of a quiescent state and the heel section is set to T0 and H0. When the 2nd location of T1 or the heel section is set to H1 for the 2nd location of the tiptoe section measured by migration of a user's guide peg, only T1 is measured and the magnitude of a vector of T0 to T1 exceeds a threshold When it changes into the migration information which made the direction and magnitude of a vector of T0 to T1 the migration direction and passing speed which move in a virtual space while descending, only H1 is measured and the magnitude of a vector of H0 to H1 exceeds a threshold It is the configuration of changing the direction and magnitude of a vector of H0 to H1 into the migration information made into the migration direction and passing speed which move in a virtual space while going up (claim 13).
[0019] (A halt, migration information on passing speed adjustable) A processor is considered as a migration halt, when click actuation or double click actuation is detected during migration processing of a virtual space display image, or when a idle state is detected (claim 14). Moreover, a processor is considered as a downward halt and a migration halt, when ID data of the heel section are inputted beyond predetermined time during the migration processing which descends a virtual space, and when ID data of the tiptoe section are inputted beyond predetermined time during the migration processing which goes up a virtual space, it is considered as a rise halt and a migration halt (claim 15). Moreover, during the migration processing which descends a virtual space, a processor gathers passing speed, when click actuation or double click actuation is detected about the heel section, and during the migration processing which goes up a virtual space, when click actuation or double click actuation is detected about the tiptoe section, it gathers passing speed (claim 16).
[0020] (Relation between ID tag and ID reader) ID tag It is arranged so that at least one ID tag may exist in communication within the limits of ID reader. It is the configuration that each ID tag which exists in communication within the limits of ID reader communicates with ID reader, respectively. ID reader It is the

configuration of communicating with at least one ID tag of communication within the limits, and receiving the ID data. A processor When ID reader acquires one ID data, the spatial position corresponding to the ID data is made into a user's location. When ID reader acquires two or more ID data, each ID data is changed into space coordinates, and it considers as the configuration made into a user's location in quest of the average coordinate value (claim 17).
[0021] Moreover, when one ID reader receives two or more ID data to coincidence, if the at least one ID data of a processor is the same as the same ID data detected at the time of click actuation or double click actuation, it is a configuration recognized as click actuation or double click actuation (claim 18).
[0022]
[Embodiment of the Invention] Drawing 1 shows the basic configuration of the virtual space migration interface device of this invention. In addition, the basic configuration of a virtual space migration interface device is the same as that of the non-contact mold location gaging system which measures a user's 2-dimensional location on real time, and this invention is constituted using this non-contact mold location gaging system.
[0023] A floor is covered with the tile carpet 12 embedding two or more ID tags 11 in drawing. The ID reader 14 which contains the antenna which performs the communication link with the ID tag 11 in the footwear of the user 13 who moves in this tile carpet 12 top is attached. The ID tag 11 included in a communication link within the circle with the ID reader 14 transmits ID data of a proper in response to supply of power, respectively. ID data which the ID reader 14 received are transmitted from the transmitting unit 15 which a user 13 carries, and it is transmitted to a processor 17 through the receiving unit 16 prepared independently, and while being changed into the positional information in real space, various actuation information is recognized.
[0024] In addition, the transmitting unit 15 may be attached in some footwear. Moreover, as long as the transmitting unit 15 does not have trouble in the communication link with the ID tag 11 and the ID reader 14, they may be the ID reader 14 and one. Moreover, it is good also as a configuration which attaches two or more ID tags 11 in a base, and a user 13 moves in a it top.
[0025] Drawing 2 shows the outline configuration of the ID tag 11 and the ID reader 14. The ID reader 14 is equipped with a modulation circuit 21, a demodulator circuit 22, an antenna 23, and the communications control circuit 24 in drawing. The power supply section is omitting. It is transmitted from an antenna 23 and the signal (an electric power supply signal and ID-request signal) outputted from the modulation circuit 21 restores to the signal (ID data) received at the antenna 23 in a demodulator circuit 22. The communications control circuit 24 performs transmit/receive control of a modulation circuit 21 and a demodulator circuit 22, and transmitting processing to an external transmitting unit.
[0026] The ID tag 11 is equipped with an antenna 31, a power circuit 32, a modulation circuit 33, a demodulator circuit 34, and a control circuit 35. A power circuit 32 changes into direct current power the electric power supply signal received at the antenna 31, and supplies it to each part. It gets over in a demodulator circuit 34, and the ID-request signal received at the antenna 31 is notified to a control circuit 35. A control circuit 35 outputs ID data of a proper beforehand assigned to ID tag to a modulation circuit 33. ID data modulated in the modulation circuit 33 are transmitted from an antenna 31.
[0027] Thus, the ID tag 11 does not have a power source, but operates with the power supplied by the electromagnetic induction type from the ID reader 14, and has composition which answers ID data of a proper, respectively. ID data which the ID reader 14 received are transmitted to a processor 17 through the transmitting unit 15 and the receiving unit 16 which are shown in drawing 1 , and are changed into a user's 13 positional information (2-dimensional coordinate) by collating with the mapping table showing the relation between ID data and real space. The above is the fundamental configuration and actuation using ID tag of a location gaging system.
[0028] It enables it for one ID reader to acquire two or more ID data at once from two or more ID tags, and to use for location measurement with the configuration of this invention (claims 17 and 18), here. Drawing 3 shows the relation of the communication range of ID tag and ID reader. Here, since it is easy, the communication range 41 of ID tag is expressed with a point.
[0029] It arranges so that the communication range 41 of at least one ID tag may be included in the communication range 42 of ID reader, and two or more ID data are read at once using an anti collision technique. For example, when the communication range 42 of ID reader is made circular [a diameter a], by putting ID tag in order regularly below at spacing (a/root2) of the inscribed square, it cannot be concerned with

the location of ID reader, but ID data can be read in at least one ID tag. Furthermore, two or more ID data can be read according to the location of ID reader.
[0030] Each of this ID data is transmitted to a processor, and carries out coordinate transformation, respectively. If N and each conversion coordinate are set to (x1, y1), (x2, y2), ..., (xN and yN) for the number of two or more ID data which can be read at this time, it is the coordinate value (/(x1+x2+ ... +xN) N, (y1+y2+ ... +yN)/N) of ID reader,
It can express. Namely, as shown in drawing 4 , when ID reader acquires four ID data, the way point 51 of four ID tags is made into a measuring point. When ID reader acquires three ID data, the way point 52 of three ID tags is made into a measuring point, when two ID data are acquired, the way point 53 of two ID tags is made into a measuring point, and when one ID data is acquired, the measuring point of the point 54 of the ID tag is carried out.
[0031] Thus, by this invention, a location can be measured in the precision more than spacing of ID tag by it not only can measuring a location certainly, but acquiring ID data from at least one ID tag, and acquiring ID data from two or more ID tags. However, although the precision error of the part is not avoided since the communication range 41 of ID tag has not a point but the predetermined range in fact, the precision error accompanying the communication range 41 of ID tag can be suppressed by acquiring two or more ID data to the minimum.
[0032] Moreover, in this invention (claims 1-4), it is characterized by attaching ID reader at a user's feet (for example, sole), using that it becomes impossible to receive ID data, when ID reader separates to the communication link outside of the circle to the floor embedding ID tag, recognizing taking-up-and-down actuation of a guide peg, and considering as actuation information.
[0033] Drawing 5 shows the example which recognizes vertical actuation of a guide peg as actuation information. In drawing, by making the shoes 60 which attached the ID reader 14 in the sole go up and down to a floor 62, ID reader will receive intermittently ID data transmitted from ID tag of a floor 62, and ID data will be intermittently inputted into a processor.
[0034] Usually, the location is measured, when shoes 60 are taken down to a floor 62, and the ID reader 14 of a sole receives ID data, transmits to a processor and performs the above-mentioned processing. And shoes 60 are gone up and down (step), and only minute time amount deltat recognizes intermittence of ID data into which a processor is inputted to be a certain actuation information, when reception of ID data breaks off and the same ID data are received again. That is, a processor identifies that it is the step for an actuation information input by comparing with a threshold minute time amount deltat to which ID entry of data breaks off. Furthermore, a processor can detect that the condition that ID entry of data breaks off only in minute time amount is repeated, and can recognize it according to the count as the same actuation information as the one click in mouse actuation, a double click, etc.
[0035] Moreover, a setup of still more complicated actuation information is attained by attaching the ID readers 14T and 14H in the section in the tiptoe section of a user's guide peg, respectively, and processing ID data received by each (claim 6).
[0036] Drawing 6 shows the example which recognizes vertical actuation of a guide peg as actuation information by two ID readers. Drawing 6 (1) The actuation 1 which makes a tiptoe go up and down is shown. ID reader 14H attached in the heel section always receive ID data by making a tiptoe go up and down, attaching a heel to the floor embedding ID tag. On the other hand, a tiptoe doubles ID reader 14T attached in the tiptoe section up and down, and they receive ID data intermittently. By this, ID data from ID data 14H of the heel section will be continuously inputted into a processor, and ID data from ID reader 14T of the tiptoe section will be intermittently inputted into it.
[0037] Drawing 6 (2) The actuation 2 which makes a heel go up and down is shown. ID reader 14T attached in the tiptoe section always receive ID data. On the other hand, a heel doubles ID reader 14H attached in the heel section up and down, and they receive ID data intermittently. By this, ID data from ID reader 14T of the tiptoe section will be continuously inputted into a processor, and ID data from ID reader 14H of the heel section will be intermittently inputted into it.
[0038] Drawing 6 (3) The actuation 3 which makes one leg go up and down attaching one guide peg to a floor is shown. A guide peg doubles ID reader 14H attached in the section in ID reader 14T attached in the tiptoe section up and down, and they receive ID data simultaneous and intermittently. By this, ID data from ID reader

14H of ID reader 14T of the tiptoe section and the heel section will be inputted into a processor simultaneous and intermittently.
[0039] Drawing 6 (4) The actuation 4 of having raised the tiptoe is shown. ID reader 14H attached in the heel section receive ID data, and ID reader 14T attached in the tiptoe section do not receive ID data. By this, only ID data from ID reader 14H of the heel section will be continuously inputted into a processor.
[0040] Drawing 6 (5) The actuation 5 of having raised the heel is shown. ID reader 14T attached in the tiptoe section receive ID data, and ID reader 14H attached in the heel section do not receive ID data. By this, only ID data from ID reader 14T of the tiptoe section will be continuously inputted into a processor.
[0041] About the above actuation 1-5, a processor can recognize many kinds of actuation information by measuring merits and demerits and the count of minute time amount deltat to which ID entry of data breaks off. For example, the click actuation in a tiptoe and the click actuation in a heel can be distinguished and treated.
[0042] (Generation of horizontal migration information) Drawing 7 shows the example of generation of the migration information at the time of attaching one ID reader in one guide peg (claims 2 and 8). Here, ID reader 14R is attached in a right leg, and the location measured by the ID reader 14R is made into R0, R1, R2, R3, and --.
[0043] Now, the location measured at the time of click actuation of a right leg or double click actuation is set to R0. And when the location which moved the right leg and was measured is set to Ri (i= 1, 2 and 3, --) and the magnitude of a vector of Ri exceeds a threshold from R0, it changes into the migration information corresponding to the direction, the migration direction [in / for magnitude (migration length) / a virtual space], and passing speed of the vector. That is, also in the same direction, a guide peg steps forward and passing speed is set up according to an amount. A right leg is click-operated or double click operated in order to stop migration in a virtual space (claim 14). It is also the same as when ID reader is attached in a left leg.
[0044] Drawing 8 shows the example of generation of the migration information at the time of attaching one ID reader in both guide pegs, respectively (claims 2 and 8). Here, the ID readers 14R and 14L are attached in both guide pegs, and R0, R1, R2, --, the location measured by ID reader 14L of a left leg are made into L0, L1, L2, and -- for the location measured by ID reader 14R of a right leg.
[0045] Now, locations R0 and L0 are measured, and when the distance is below a predetermined threshold, it is judged that it is a idle state. Next, use as a directions guide peg the guide peg which moved previously from this idle state, and let the guide peg of a idle state be the axopodium. And when the magnitude of a vector from a halt location to the migration location of a directions guide peg exceeds a threshold, it changes into the migration information corresponding to the direction, the migration direction [in / for magnitude / a virtual space], and passing speed of the vector.
[0046] Here, when the location which moved the right leg (directions guide peg) and was measured is set to Ri (i= 1, 2, --) and the magnitude of a vector from the halt location R0 to Ri exceeds a threshold, it changes into the migration information corresponding to the direction, the migration direction [in / for magnitude (migration length) / a virtual space], and passing speed of the vector. In addition, although the example by which the migration information according to the direction and magnitude toward which a directions guide peg steps on the basis of the halt location of both guide pegs is generated was shown here, the guide peg of the direction which operated [click-] or operated [double-click-] it may be processed as a directions guide peg. In order to stop migration in a virtual space, a directions guide peg is click-operated double click operated, or distance with the axopodium returns a directions guide peg to the location which becomes below the threshold that shows a halt location (claim 14).
[0047] Moreover, when a directions guide peg is used as a left leg, the migration information over the left is generated similarly. Thus, by attaching ID reader in both guide pegs, actuation of each guide peg can generate the migration information on rightward, and the migration information on leftward, and operability improves compared with the case where the migration information on right-and-left both directions is generated only on one foot.
[0048] Drawing 9 shows the example of generation of horizontal migration information at the time of attaching two ID readers in both guide pegs, respectively (claims 5, 6, and 9). Here, ID reader 14RH, 14RT, 14LH, and 14LT are attached in the heel section and the tiptoe section of both guide pegs. The location measured by ID reader 14RH of the heel section of a right leg RH0, RH1, RH2, --, The location measured [location / which is measured by ID reader 14RT of the tiptoe section of a right leg] by LH0 and ID reader 14LT of the tiptoe

section of a left leg in RT0, RT1, RT2, --, the location measured by ID reader 14LH of the heel section of a left leg is set to LT0.
[0049] Now, locations RH0, RT0, LH0, and LT0 are measured, and the distance of RH0 and LH0 and the distance of RT0 and LT0 are found, respectively. Here, each distance is the predetermined threshold a1 and a2, respectively. In being the following, it judges that it is a idle state. In addition, threshold a1 a2 You may not necessarily be the same value and it can set up suitably according to a user. Next, use as a directions guide peg the guide peg which moved previously from this idle state, and let the guide peg of a idle state be the axopodium.
[0050] By drawing 9 , a left leg is made into the axopodium and the condition of having moved the right leg as a directions guide peg is shown. Here, the locations RTi and RHi (i= 1, 2, --) of the section are measured by migration of a right leg in the tiptoe section. At this time, the include angle theta which the vector B of RTi makes is computed from the vector A of the location RH 0 of the idle state of a right leg to RT0, and the location RHi of a migration place. This expresses change of the sense of a right leg, and when the include angle theta to make is below a threshold, the sense considers that it is not changing and makes change of the location of a right leg migration information. Here, there is change of the location of a right leg that it is effective, when the magnitude of the vector D of RH1 exceeds a threshold from the vectors C or RH0 of RT0 to RT1, and it becomes the direction of one of the vectors, the migration direction [in / in magnitude (for example, the smaller one) / a virtual space], and the migration information corresponding to passing speed. Moreover, when a directions guide peg is used as a left leg, the migration information over the left is generated similarly.
[0051] In addition, although the example by which the migration information according to the direction and magnitude toward which a directions guide peg steps on the basis of the halt location of both guide pegs is generated was shown here, the guide peg of the direction which operated [click-] or operated [double-click-] it may be processed as a directions guide peg. In order to stop migration in a virtual space, a directions guide peg is click-operated double click operated, or distance with the axopodium returns a directions guide peg to the location which becomes below the threshold that shows a halt location (claim 14).
[0052] Moreover, although the example by which the migration information according to the direction and magnitude toward which a total of four ID readers are attached in both guide pegs here, and a directions guide peg steps is generated was shown, it is also possible to generate the migration information on right-and-left both directions only on foot like [while] the case where attach two ID readers in the section in the tiptoe section of one guide peg, and it is shown in drawing 7 .
[0053] (Generation of the migration information on a hand of cut) Drawing 10 shows the example of generation of the migration information on the hand of cut at the time of attaching two ID readers in both guide pegs, respectively (10 claims 5-7, 11). The location measured by virtual space ID reader 14RH, 14RT, 14LH, and 14LT is the same as that of the case of drawing 9 , a idle state is judged similarly and the axopodium and a directions guide peg are set up.
[0054] By drawing 10 , a left leg is made into the axopodium and the condition of having moved the right leg as a directions guide peg is shown. Here, the locations RT1 and RH1 of the section are measured by migration of a right leg in the tiptoe section. At this time, the include angle theta which the vector of RT1 makes is computed from the vector of the location RH 0 of the idle state of a right leg to RT0, and the location RH 1 of a migration place. This expresses change of the sense of a right leg, when the include angle theta to make exceeds a threshold, it considers that the sense is changing, and it is taken as the migration information corresponding to the include-angle direction to make, a hand of cut [in / for the magnitude of an include angle / a virtual space], and rotational speed. Moreover, it becomes the direction of the vector of RT0 to RT1, or a vector with the smaller vector of RH0 to RH1, the migration direction [in / in magnitude / a virtual space], and the migration information corresponding to passing speed. Moreover, when a directions guide peg is used as a left leg, the migration information over the left is generated similarly.
[0055] In addition, although the example by which the rotation information according to the direction and magnitude toward which a directions guide peg steps on the basis of the static position of both guide pegs is generated was shown here, the guide peg of the direction which operated [click-] or operated [double-click-] it may be processed as a directions guide peg. In order to stop migration in a virtual space, a directions guide peg is click-operated double click operated, or distance with the axopodium returns a directions guide peg to the location which becomes below the threshold that shows a halt location (claim 14).

[0056] Drawing 10 (1) theta rotation of a tiptoe is done centering on the heel of a right leg, the hand of cut and rotational speed of the direction of theta are given, and the case where there is no migration horizontally is shown. That is, it is the case where the vector of RH0 to RH1 is 0.
[0057] Drawing 10 (2) theta rotation of a heel is done centering on the tiptoe of a right leg, the hand of cut and rotational speed of the direction of theta are given, and the case where there is no migration horizontally is shown. That is, it is the case where the vector of RT0 to RT1 is 0.
[0058] Drawing 10 (3) theta rotation of a tiptoe is done centering on a heel, moving a right leg, the hand of cut and rotational speed of the direction of theta are given, and the horizontal migration information corresponding to the direction and magnitude of a vector of RH0 to RH1 is generated.
[0059] Drawing 10 (4) theta rotation of a heel is done centering on a tiptoe, moving a right leg, the hand of cut and rotational speed of the direction of theta are given, and the horizontal migration information corresponding to the direction and magnitude of a vector of RT0 to RT1 is generated.
[0060] (A rise or generation of the migration information on descent) Drawing 11 R> 1 shows the example of generation of the migration information on the rise/descent at the time of attaching two ID readers in both guide pegs, respectively (12 claims 5-7, 13). The location measured by virtual space ID reader 14RH, 14RT, 14LH, and 14LT is the same as that of the case of drawing 9 , a idle state is judged similarly and the axopodium and a directions guide peg are set up.
[0061] By drawing 11 , a left leg is made into the axopodium and the condition of having moved the right leg as a directions guide peg is shown. Here, although the locations RT1 and RH1 of the section are measured by migration of a right leg in the tiptoe section, it is drawing 6 (4) and (5) at a migration place. It shall suppose that the tiptoe section or the heel section has been raised like, and only one location shall be measured. Therefore, change of the sense of a right leg is not detected. Here, when RH0 will be measured and RT0 will not be measured to the locations RH0 and RT0 of the idle state of a right leg, the migration information which the tiptoe is going up and goes up is generated. Moreover, when RT0 will be measured and RH0 will not be measured, the migration information which the heel is going up and descends is generated. Moreover, change of the location of a right leg becomes effective when the magnitude of a vector of a vector or RH0 to RH1 of RT0 to RT1 exceeds a threshold, and it becomes the direction of one of the vectors, the migration direction [in / in magnitude / a virtual space], and the migration information corresponding to passing speed. Moreover, when a directions guide peg is used as a left leg, the migration information over the left is generated similarly.
[0062] Drawing 11 (1) Since the tiptoe of a right leg is raised and the location RH 0 of a heel has not changed, the migration information on a rise is generated from the spot. In addition, although the sense of a right leg has changed by a diagram, since the tiptoe is raised, change of the sense is not detected.
[0063] Drawing 11 (2) Since the heel of a right leg is raised and the location RT 0 of a tiptoe has not changed, the migration information on descent is given from the spot. In addition, although the sense of a right leg has changed by a diagram, since the heel is raised, change of the sense is not detected.
[0064] Drawing 11 (3) The tiptoe is raised moving a right leg, and it corresponds to the direction and magnitude of a vector of RH0 to RH1, and the migration information on a rise is generated. In addition, although the sense of a right leg has changed by a diagram, since the tiptoe is raised, change of the sense is not detected.
[0065] Drawing 11 (4) The heel is raised moving a right leg, and it corresponds to the direction and magnitude of a vector of RT0 to RT1, and the migration information on descent is generated. In addition, although the sense of a right leg has changed by a diagram, since the heel is raised, change of the sense is not detected.
[0066] in addition -- it is whether to raise in order to stop the updrift in a virtual space, or downward migration -- or a tiptoe is taken down and both locations are detected by coincidence beyond predetermined time (claim 15). For example, drawing 11 (3) If the tiptoe of a right leg is taken down to a location, updrift will be stopped and will serve as only migration information on the direction of a vector of RH1 from RH0. Moreover, it sets up so that passing speed may be gathered by performing click actuation or double click actuation about the tiptoe section, when a tiptoe is raised and the migration information on a rise is generated, and when a heel is raised and the migration information on descent is generated, you may set up by carrying out click actuation or double click actuation about the heel section so that passing speed may be raised (claim 16).
[0067]
[Effect of the Invention] As explained above, the virtual space migration interface device of this invention can generate the migration information which combined a horizontal direction, a hand of cut, a rise, each migration

information on descent, and them by actuation which steps toward a guide peg 1 step all around on the floor where the user who attached ID reader underfoot embedded ID tag, or a base. Furthermore, corresponding to the migration direction in a virtual space, operability can be raised by making a guide peg on either side correspond to the migration information on the right and the left, respectively. Especially, generation of a rise and the migration information on descent also becomes possible using the migration information on the hand of cut by the twist of an ankle, and the include angle of an ankle, and operability can be raised corresponding to the migration direction in a virtual space.

[0068] Thereby, the virtual space migration interface device which generates the migration information on the direction of a three dimension is realizable with the easy configuration using ID tag and ID reader.

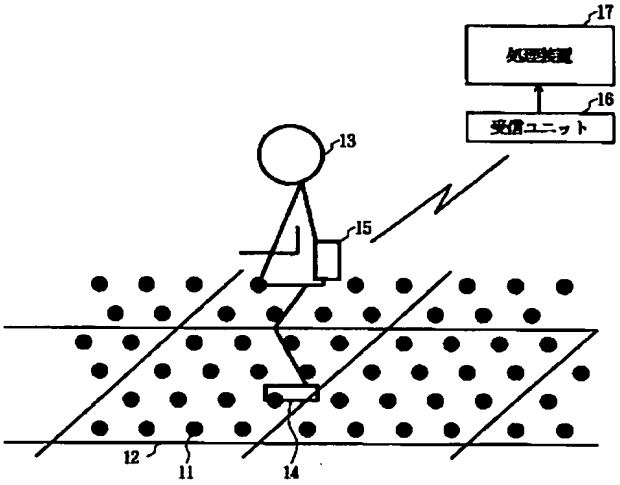
[Translation done.]

* NOTICES *

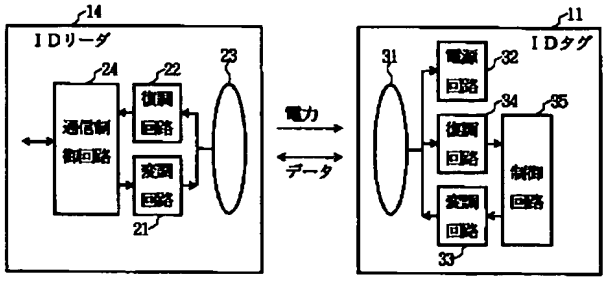
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

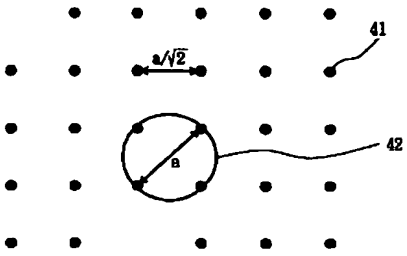
[Drawing 1]
本発明の仮想空間移動インタフェース装置の基本構成



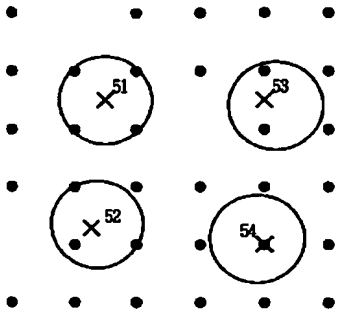
[Drawing 2]
IDタグ11とIDリーダ14の概略構成



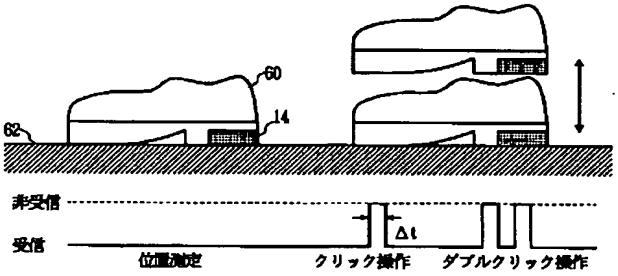
[Drawing 3]
IDタグとIDリーダの交信範囲の関係



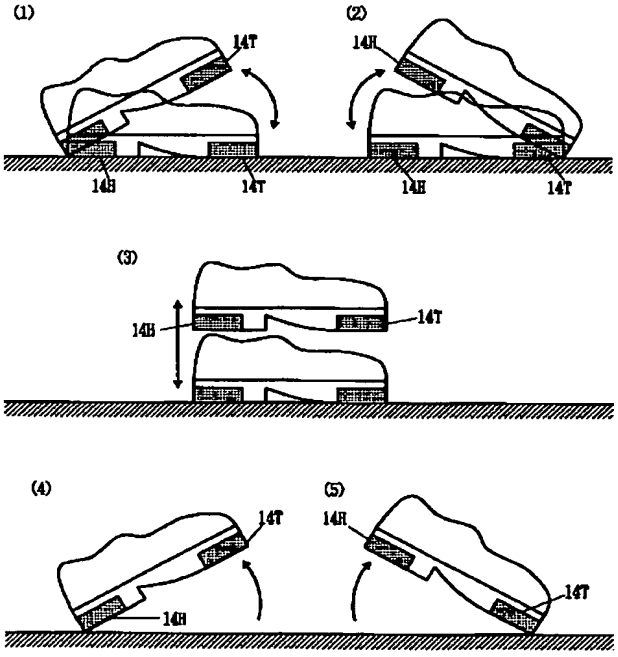
[Drawing 4]
複数のＩＤデータを用いた位置決定アルゴリズム



[Drawing 5]
足の上下動作を操作情報として認識する例

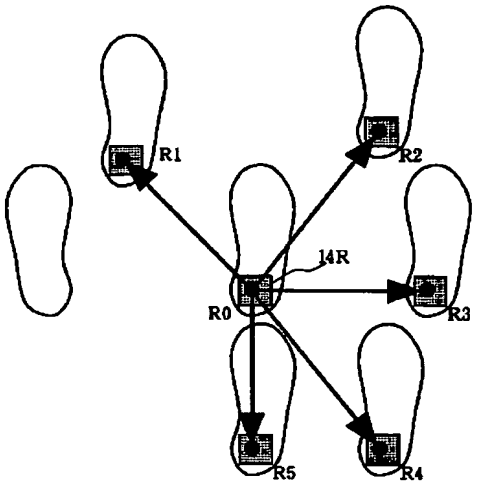


[Drawing 6]
２つのＩＤリーダにより足の上下動作を操作情報として認識する例



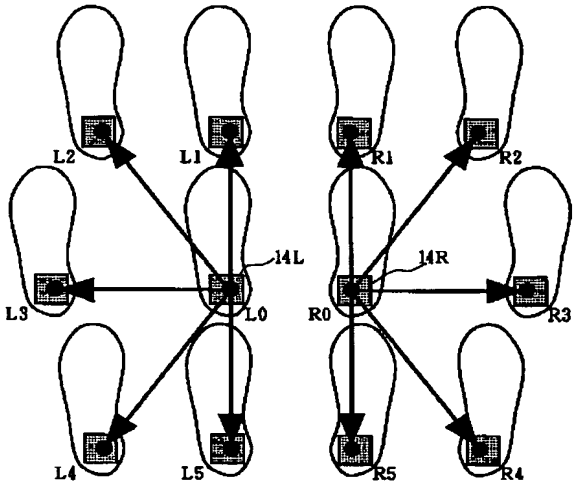
[Drawing 7]

一方の足にＩＤリーダを１つ取り付けた場合の移動情報の生成例



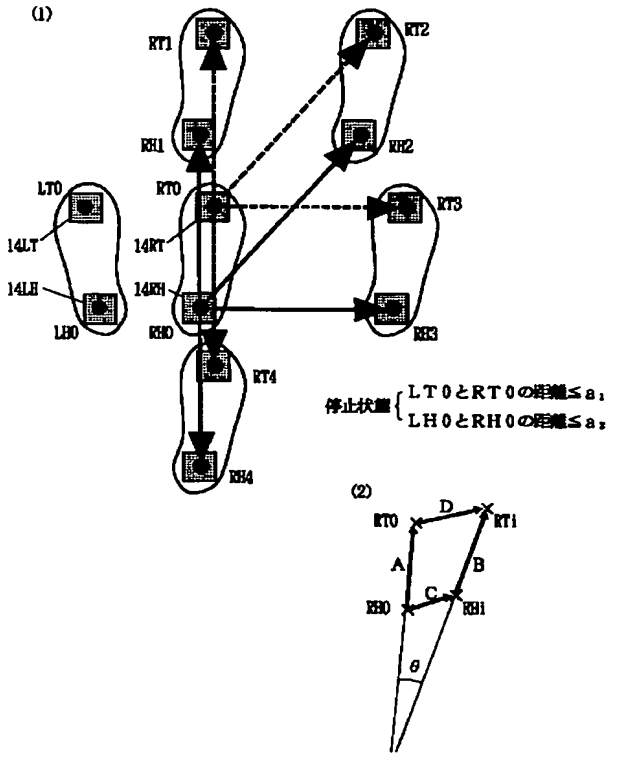
[Drawing 8]

両足にＩＤリーダをそれぞれ取り付けた場合の移動情報の生成例



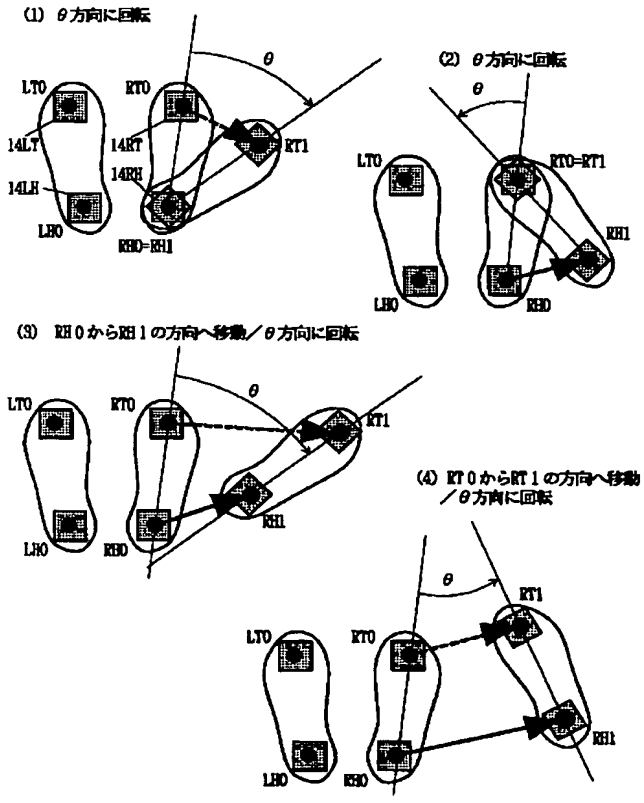
[Drawing 9]

両足にＩＤリーダをそれぞれ２つ取り付けた場合の水平方向の移動情報の生成例



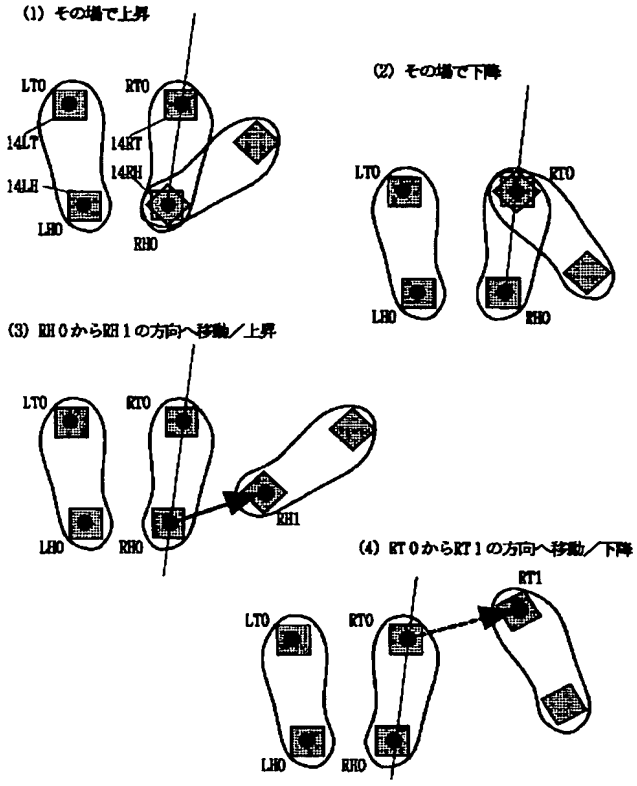
[Drawing 10]

両足にＩＤリーダをそれぞれ２つ取り付けた場合の回転方向の移動情報の生成例



[Drawing 11]

両足にＩＤリーダをそれぞれ２つ取り付けた場合の上昇／下降の移動情報の生成例



[Translation done.]